**Testimony before the Congressional Field Hearing**

**convened by**

**Representatives Robert Brady, Chaka Fattah, and Allyson Schwartz**

***Vibrant Communities, Healthy Waters, and Job Opportunities:***

***Exploring Green Infrastructure and Role of Federal Policy***

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**by**

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Good morning Congressman Brady, Congressman Fattah, and Congresswoman Schwartz. I thank you and the staff of the Northeast-Midwest Institute for the opportunity to address the *Vibrant Communities, Healthy Waters, and Job Opportunities: Exploring Green Infrastructure and Role of Federal Policy* Philadelphia field hearing. My name is Liz Garland and I am Associate Director of American Rivers' Clean Water program in Pennsylvania. American Rivers is the preeminent national advocate for healthy rivers and the communities that depend upon them. American Rivers believes that sustaining rivers and clean water vital to our nation's health, safety, and quality of life requires an approach to water management that integrates green infrastructure and water efficiency into our conventional water infrastructure. This hearing is an example of Congress' readiness to promote a vision for sustainable water management that will integrate our built and natural assets by focusing first on green infrastructure. Aligning federal funding and policies to achieve this vision will green America's blue collar work force with skills that support long lasting and effective projects while also reducing polluted stormwater run-off and sewer overflows today, and making our communities more resilient to a changing climate in the future. On behalf of our 65,000 members and supporters, I applaud this hearing's exploration of the opportunity for green infrastructure within federal policy, and for the opportunity to testify.

This testimony will address the following topics:

- A vision for 21st century water infrastructure;
- Defining "Green infrastructure;"
- Green infrastructure and green jobs; and
- Recommendations for green infrastructure.

## Overview: A Vision for 21st Century Water Infrastructure

This moment in time offers a unique opportunity for Congress to put forth a new vision for sustainable water management. The public has recently come to understand that we must transform our approach to energy by embracing efficiency and renewable

technologies that rely upon nature to fuel our economy in the 21st century. We need a similarly transformative model for water infrastructure. A new vision for sustainable water infrastructure is one that integrates traditional and green infrastructure in a way that works with nature instead of against it. Green infrastructure approaches to clean water management include using rooftop vegetation to control stormwater and reduce energy use, restoring wetlands to retain floodwater, installing permeable pavement to mimic natural hydrology, and using potable water more efficiently. Such smart infrastructure approaches have far-reaching benefits – they reduce stormwater runoff and sewage overflows, increase water infiltration to recharge drinking water supplies, and create valuable green space. They also cost less than traditional pipes, treatment plants and reservoirs, and create domestic jobs. By treating water on-site and reducing water use, green stormwater controls and water efficiency reduce energy costs and corresponding greenhouse gas emissions by decreasing the amount of water that must be pumped, distributed and treated. Moreover, these green approaches are flexible in terms of scale and can be integrated at the building and neighborhood scale as well as across watersheds and river basins. The multiple benefits of these approaches and flexibility that they provide make them a perfect response to the uncertainties and volatility of a changing climate.

Given that the nation's economy is struggling with the worst crisis since the 1930s, making smart investments with multiple benefits is all the more critical. At the same time the country is struggling financially, the nation's decaying infrastructure is threatening long-term economic competitiveness. America's water infrastructure is at a crisis point: water and wastewater systems now receive the lowest grade, a D-, of all infrastructure systems rated by the American Society of Civil Engineers.[1] While aging sewers and treatment plants, growing population, and sprawling development patterns strain our existing clean water systems we continue to lose crucial elements of our natural clean water system – headwater streams, wetlands, forests, and natural floodplains. Climate change is already making the problem worse, and scientists predict more frequent and

[1] American Society of Civil Engineers, Report Card on America's Infrastructure, accessed online Oct. 25, 2008, http://www.asce.org/reportcard/2005/index2005.cfm

severe droughts and floods as the planet warms. In fact, one-third of the U.S. experienced moderate to severe drought last summer and 40 state water managers have forecast significant water shortages in the coming five years. Annual flood damages in the U.S. have increased from $1 billion in the 1940's to $5 billion in the 1990's.[2]

Water quality is also at risk. The U.S. Environmental Protection Agency (EPA) has stated that water quality declines are reversing decades of improvement, and in less than a decade, without substantial increases in water infrastructure funding, pollution will return to 1970 levels.[3] Furthermore, climate change will stress clean water at both extremes – some areas will experience increased flooding and corresponding sewer overflows and stormwater pollution while other areas that become drier will encounter a higher concentration of water pollution. To reverse this trend we will need to spend over $650 billion on capital improvements for our drinking water and sewage infrastructure through 2019.

Unfortunately, since 2002, federal clean water funding has declined significantly, leaving states and local governments to fill the gap. A recent gap analysis for Pennsylvania determined that $43.8 billion would be needed to fill the gap between revenue and need for water infrastructure over the next 20 years.[4] Nationally, between 2004 and 2005, states and municipalities spent $36 billion on sewers and another $46 billion on drinking water, and in 2006, local governments made 96% of all sewage treatment investments.[5] However, the financial crisis and economic downturn have sharply decreased local investment.

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[2] Pielke, R.A. Jr. "Nine Fallacies of Floods". *Climatic Change,* #42, 119-127

[3] U.S. EPA, The Clean Water and Drinking Water Infrastructure Gap Analaysis, at 8, September, 2002 (http://www.epa.gov/owm/gapreport.pdf)

[4] Governor's Sustainable Infrastructure Task Force Report, November 2008

[5] U.S. Conference of Mayors, Mayors Water Council, *Local Government Investment In Municipal Water And Sewer Infrastructure: Adding Value To The National Economy*, at 1, August 14, 2008 (accessed October 25, 2008, http://www.usmayors.org/pressreleases/uploads/LocalGovtInvtInMunicipalWaterandSewerInfrastructure.pdf )

We need a new national commitment to water infrastructure investment, but we must also invest more wisely. The new agenda for water in this country cannot rely upon the outmoded approaches of the past two centuries. Continuing with old approaches would lock in investments for decades that are too costly, too inflexible, and may cause more harm than benefit. In order to reverse these trends, American Rivers has urged Congress to direct more funding and align policies to solutions that work best and most cost effectively in a world dominated by climate change and new economic challenges.

Wisely, Congress has chosen to make investments in 'green' water infrastructure projects through the economic stimulus package (the American Recovery and Reinvestment Act), by requiring that at least 20% of all water infrastructure investment through the State Revolving Funds be used for green infrastructure, water efficiency and other environmental innovation. These projects will provide both an immediate economic boost and adequate clean water to drive future economic growth. Already, the demand for stimulus dollars to fund green infrastructure and water efficiency across the nation is demonstrating a need for long term commitment to green approaches of water management from federal funding programs. For instance, Philadelphia is ready to invest more than $9 million in green infrastructure recently awarded by PENNVEST, but this represents just a fraction of the green infrastructure project needs identified by the City. Immediate and on-going investment in green infrastructure will put Americans to work building sustainable, adaptable water infrastructure that will be our legacy to future generations.

American communities need a public works program that can support economic growth, create new jobs and protect our most vital resource: clean water. Retrofitting homes and businesses with efficient plumbing fixtures has been shown to significantly lower water consumption, add effective capacity to sewage treatment systems, reduce energy costs associated with treatment and transportation of water and improve ecosystem health by leaving more water in rivers. New York City, for example, replaced 1.3 million inefficient toilets through a rebate program in the 1990s, reducing per capita water

consumption 34% and saving $200 million in water infrastructure costs.[6] Green roofs, rain gardens and other green infrastructure techniques can reduce wastewater flowing into overtaxed sewer systems, minimize flooding and recharge groundwater supplies. By integrating green infrastructure into their sewer overflow reduction plan, the City of Indianapolis will be able to reduce the size of sewage pipes and save over $300 million.[7] Protecting and restoring wetlands and other natural areas near rivers can reduce and slow flood peaks, reducing damages downstream. They also absorb sediment and other pollutants and prevent them from contaminating waterways, cutting water treatment costs. Transforming our water infrastructure to focus on protecting, restoring and replicating our natural environment will be a necessary part of creating communities that are economically and environmentally vibrant.

## Green Infrastructure Defined

As a working concept, green infrastructure can broadly be defined as an approach to water management that reduces stormwater runoff, sewer overflows, and flooding by protecting, restoring, or mimicking the natural hydrology of an area. This is often accomplished through the use of plants and soils or engineered solutions that recreate natural processes.[8] In other words: planting trees and restoring wetlands, rather than building costly new water treatment plants; replacing parking lots and driveways with permeable pavement to reduce wastewater treatment demand; increasing water efficiency instead of building new water supply dams; and restoring floodplains instead of building taller levees.[9]

Green infrastructure solutions can be applied on different scales, from the house or neighborhood level, to the broader landscape level. On the local level, green infrastructure practices include rain gardens, permeable pavements, green roofs,

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[6] New York City Department of Environmental Protection. "Water Conservation Program" Flushing, NY: New York City Department of Environmental Protection, 2006.
[7] *Sewer Overhaul Means More Green*, The Indianapolis Star. Oct. 14, 2008
[8] Gary Belan & Katherine Baer, *Green Communities for Clean Water*, River Network, River Voices 18:1 (2008).
[9] See generally, American Rivers, *Greening Water Infrastructure* http://www.americanrivers.org/site/PageServer?pagename=AR7_GreenInfrastructure_Background.

infiltration planters, trees and tree boxes, and rainwater harvesting systems that maximize the opportunities for stormwater to infiltrate into the ground or transpire back into the atmosphere. At the largest scale, the preservation and restoration of natural landscapes (such as forests, floodplains, streams and wetlands) are critical components of green infrastructure.

Already, green infrastructure is being used successfully by a number of cities around the country.[10] Philadelphia, Chicago, Portland, Seattle, Milwaukee, San Francisco and others are recognized as leaders in this area. Interest continues to grow as communities recognize the multiple benefits of using cost-effective techniques such as rain gardens, green roofs, and permeable pavement to manage stormwater on-site, reducing the need for expensive, hard infrastructure projects and stretching scarce dollars further. In Clayton County, Georgia, for example, a constructed wetland system that receives treated wastewater and recharges reservoirs had a consistent supply of water throughout the drought. While surrounding communities had severe water use restrictions and saw reservoirs drop below 50% capacity, Clayton County never dipped below 77% of reservoir capacity.[11] Additionally, the constructed wetland system has saved roughly $50,000 in annual electricity costs from reduced treatment needs[12] and has eliminated the need for 300 miles of pipes and 20,000 sprinklers.[13]

This surge in interest from cities, towns and counties across America has been enhanced by the EPA's Green Infrastructure Initiative, which has broad support from industry, local government, and conservation groups.[14] Formal recognition by EPA of the validity

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[10] See generally, NRDC, *From Rooftops to Rivers: Green Strategies for Controlling Stormwater and Sewer Overflows* (2006) and Water Environment Research Foundation, *Using Rainwater to Grow Livable Communities* (2008) http://www.werf.org/livablecommunities/.

[11] Saporta, M. August 24, 2008. Praise flows freely for Clayton County's water system. Atlanta Journal-Constitution; Associated Press. October 19, 2007. No backup plan in place for drought-stricken Atlanta. Fox News.

[12] Clingan, C. June 2, 2008. Green infrastructure highlights American Wetlands Month. National Association of Counties, County News. Washington, D.C.

[13] Clayton County Water Authority. 2005. 50 years of insight: the story of Clayton County Water Authority (1955-2005). Morrow, GA.

[14] U.S. EPA, *Green Infrastructure Partnership* http://cfpub.epa.gov/npdes/greeninfrastructure/gisupport.cfm. Partners include the Association of Interstate

of using green infrastructure techniques to meet regulatory requirements for combined sewer overflows (CSOs) and stormwater under the Clean Water Act further illustrates the value of these approaches.[15]

One of the main advantages of using green infrastructure is the multiple benefits it provides compared to conventional infrastructure. These benefits include cleaner water, more reliable water supply, cooler temperatures, improved human health and adaptation to climate change.[16] While the environmental benefits of green infrastructure are well documented, the short-term economic benefits have not been explored as extensively. The following section examines three categories of green water infrastructure projects and demonstrates that each would provide significant job creation to stimulate the national economy while producing long-lasting economic benefit to our water infrastructure investments:

## Green Infrastructure and Green Jobs

In light of our nation's current economic situation it is important to highlight that green infrastructure creates jobs and increases revenue for the various sectors. Below we demonstrate the proven job creation of green roofs, water efficiency retrofits and wetland restoration as illustrative of the potential for green job creation.[17] For the first two categories we estimate the job creation and other economic benefits from implementing these techniques on a national scale. The results demonstrate that green infrastructure can have far-reaching economic impacts on multiple sectors of the American economy while

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Water Pollution Control Administrators, the American Public Works Association, the National Association of Clean Water Agencies, and the National Association of Environmental Local Government Professionals.

[15] U.S. EPA, *Use of Green Infrastructure in NPDES Permits and Enforcement*, EPA Memo to Regional Water Division Directors State NPDES Coordinators, Aug. 2007. http://www.epa.gov/npdes/pubs/gi_memo_enforce.pdf.

[16] These benefits are explored more fully in Testimony by Andrew Fahlund before the House Committee on Transportation and Infrastructure, Feb. 4, 2009 (www.americanrivers.org/SWMTestimony)

[17] Please note that the information presented here was originally published in two primary sources: American Rivers, Creating Jobs and Stimulating the Economy through Investment in Green Water Infrastructure (http://www.americanrivers.org/assets/pdfs/green-infrastructure-docs/green_infrastructure_stimulus_white_paper_final.pdf) , and Alliance for Water Efficiency: A Stimulus Package for Sustainable Water Infrastructure Investments (http://www.allianceforwaterefficiency.org/uploadedFiles/News/NewsArticles/NewsArticleResources/Clean_Water_Green_Jobs-FLOW-Dec08.pdf)

also beginning to build the water infrastructure important to maintaining competitiveness in the 21st century. A short summary is provided below with a more detailed explanation to follow.

*Green roofs*: Covering even 1% of large buildings in America's medium- to large-sized cities with vegetated roofs would create over 190,000 jobs and provide billions in revenue to suppliers and manufacturers that produce or distribute green roof-related materials.

*Water Efficiency*: A $10 billion investment in water efficiency projects would produce a total economic output of $25-28 billion, create 150,000-220,000 jobs and save 6.5-10 trillion gallons of water.

*Wetland Restoration*: The Cache River restoration, which directly employed 220 people and created over $12.6 million in economic output, demonstrates the potential of a long list of pending wetland restoration projects.

### ***Green roofs***

Green roofs have long been recognized as an effective strategy to control stormwater, improve air quality and lower energy bills. Green roofs consist of a layer of soil and vegetation installed on top of a building. Widely used throughout Europe, they are rapidly gaining acceptance in the U.S. as well. Reducing both polluted stormrwater runoff and energy costs required for heating and cooling. A number of cities have undertaken demonstration projects, and cities such as Philadelphia, Portland, Oregon and New York have recently begun to offer financial incentives to install green roofs. EPA has recognized green infrastructure as an important tool in meeting water quality objectives and is encouraging its use in Clean Water Act permits.[18]

[18] U.S. Environmental Protection Agency. Green Infrastructure Initiative. Announced April 19, 2007 in "Green Infrastructure Statement of Intent" Agreement between U.S. EPA, National Association of Clean Water Agencies, Natural Resources Defense Council, Low Impact Development Center and Association of State and Interstate Water Pollution Control Administrators. http://www.epa.gov/npdes/pubs/gi_intentstatement.pdf. Accessed December 3, 2008.

Less attention has been paid to the near-term economic stimulus effect of green roof construction. Our analysis demonstrates that covering even 1% of large roof surfaces in all medium to large American cities would generate over 190,000 jobs. Billions of dollars would go to American workers and the manufacturers that supply green roof materials. Indirect economic effects would spread the stimulus effect across a broader section of the economy. Green roof programs have the added advantage that they can be implemented more rapidly than large-scale water infrastructure projects and can thus provide an immediate boost to the economy. The combination of an immediate economic boost and long-term energy and water benefits makes green roofs a sound investment.

### *Methodology*

Our analysis of the economic stimulus effect of a nationwide green roof initiative is based on draft data from a forthcoming report on the job creation potential of green roof construction in Washington, DC.[19] We adopt the estimates used in this study (Table 1) of the cost per square foot of green roof installed and the number of jobs created per million dollars of direct investment. Based on these ratios, we extrapolated the job creation potential to larger investments in green roofs across the country. It should be noted that labor and material costs in Washington, DC differ from those in other parts of the country. The median wage in Washington, DC is 29% higher than the median national wage.[20] Thus for a given level of investment; a national initiative could cover more buildings with green roofs and create more jobs. While we use the Washington, DC figures to extrapolate the economic stimulus potential of green roofs to the rest of the country, the numbers likely underestimate the overall impact.

**Table 1 – Washington, DC Green Roof Analysis[21]**

| Number of Jobs | Cost | Total Green Roof Area |
|---|---|---|

[19] Washington, DC Office of Planning. Draft data from forthcoming report, Green Jobs from Green Roofs, 2009.
[20] Lazere, Ed. "DC's Two Economies: Many Residents Are Falling Behind." Washington, DC: DC Fiscal Policy Institute, 2007, p. 13.
[21] Washington, DC Office of Planning, op. cit.

| Created | | (ft2) |
|---|---|---|
| 5,895 | $299,900,000 | 14,994,000 |
| 11,791 | $599,800,000 | 29,988,000 |
| 17,686 | $899,600,000 | 44,982,000 |

In order to estimate the cost of a nationwide green roof initiative, we first determined the total area to be covered. Based on our calculations, the total green roof-ready area in U.S. cities over 50,000 people is 48.5 billion square feet.[22] Based on this area we created a range of cost estimates for a national green roof initiative depending on the percentage of green roof-ready area covered. From this cost estimate we generated a range of job creation numbers based on the Washington, DC data.

***Results***

Table 2 demonstrates that a nationwide green roof initiative has immense potential to create jobs and stimulate the economy. An initiative covering just 1% of the nation's green roof-ready building area in medium and large cities would create over 190,000 jobs. The cost of this initiative would total approximately $10 billion, making the job creation benefits comparable to other types of public infrastructure investments. In addition, billions of dollars of this total would go to U.S. manufacturers and suppliers related to the green roof industry.

**Table 2 – Job Creation Benefits of a National Green Roof Initiative**

| Greenroof-ready area covered | Cost[23] | Number of jobs created[24] |
|---|---|---|
| 1% coverage | $9,694,674,570 | 190,580 |
| 2.5% coverage | $24,236,686,425 | 476,450 |
| 5% coverage | $48,473,372,851 | 952,900 |
| 7.5% coverage | $72,710,059,276 | 1,429,349 |
| 10% coverage | $96,946,745,701 | 1,905,799 |

[22] For a complete description of the methodology used in this projection, please contact Rob Kimball: rkimball@americanrivers.org
[23] Washington, DC Office of Planning, op. cit.
[24] *Ibid*

Table 3 demonstrates the job creation benefits of green roof programs in one city. For example, covering 5% of Chicago's green roof-ready rooftop area would create nearly 8,000 jobs.

**Table 3 – Chicago, IL**

| Percent coverage | Cost | Jobs created |
|---|---|---|
| 1% | $80,722,604 | 1,587 |
| 5% | $403,613,021 | 7,934 |
| 20% | $1,614,452,083 | 31,737 |
| 40% | $3,228,904,166 | 63,474 |
| 60% | $4,843,356,249 | 95,212 |

While a national green roof initiative would have a strong stimulative effect on the economy, the greatest benefit would come from the reduced stormwater runoff, energy savings, lower air pollution levels and cooler temperatures. Table 4 demonstrates the stormwater runoff benefits from installing green roofs in Washington, DC. Even the most moderate scenario reduces runoff by nearly 300 million gallons. That implies 300 million gallons of stormwater runoff containing pathogens, heavy metals, nutrients and other pollutants would not flow into the Anacostia or Potomac rivers or enter the city's sewer system and cause combined sewer overflows (CSO). This reduction in runoff and sewer overflows improves public health, eases pressure on aging sewer infrastructure, enhances recreational use of local waterways and improves habitat for aquatic species. By reducing energy costs associated with heating and cooling buildings (on hot summer days, green roofs can be as much as 90º cooler than conventional roofs), green roofs also lower greenhouse gas emissions and combat global warming.

**Table 4 – Washington, DC Stormwater Benefits[25]**

| Green Roof Coverage | Total Green Roof Area (sq.ft.) | Annual Stormwater Storage by Green roofs (gal) | Reduction in Annual Citywide Runoff | CSO Volume Reduction (gal) |
|---|---|---|---|---|
| 20% | 14,944,000 | 297,000,000 | 1.2% | 75,000,000 |
| 40% | 29,988,000 | 594,000,000 | 2.3% | 150,000,000 |

[25] Deutsch et al. "Re-greening Washington, DC: A Green Roof Vision Based on Quantifying Storm Water and Air Quality Benefits." Casey Trees Endowment Fund and Limno-Tech, Inc, 2002.

| | | | | |
|---|---|---|---|---|
| 60% | 44,982,000 | 891,000,000 | 3.5% | 210,000,000 |
| 80% | 59,976,000 | 1,188,000,000 | 4.6% | 273,000,000 |
| 100% | 74,970,000 | 1,485,000,000 | 5.8% | 334,000,000 |

***Water Efficiency***

Water efficiency programs offer the opportunity to create jobs and spur economic growth in the near-term while strengthening communities, ecosystems and economic competitiveness in the long run. There is a great potential to increase water efficiency throughout the U.S. EPA estimates there are 100 million antiquated toilets that use 2-3 times more water per flush than modern alternatives.[26] As extended droughts become more common throughout the country, communities will need to make the most of every drop. A significant workforce will be needed to replace inefficient appliances and fixtures, improve outdoor irrigation and reduce water use in industrial and commercial applications. A recent analysis by the Alliance for Water Efficiency (AWE) – considered in depth below - found that a $10 billion investment in water efficiency programs would create a total economic output of $25-28 billion and create 150,000 to 220,000 jobs.[27]

Water efficiency programs have numerous additional benefits that will help ensure a competitive economy and healthy communities for future generations. First, a large amount of energy is needed to pump, transport and treat drinking water and collect and treat wastewater. Water-related energy use consumes 19% of California's electricity.[28] Nationally, the figure is conservatively estimated to be 3-6% though most water and energy experts believe it is much higher. Lowering demand can reduce greenhouse gas emissions and help communities lower energy costs. Reducing domestic water consumption can also lower household bills. This is especially important in low-income communities which have a disproportionate share of inefficient appliances and fixtures. Reducing demand on a city-wide scale can stretch existing water supplies further and

[26] Plumbing Fixtures market Overview: Water Savings Potential for Residential and Commercial Toilet and Urinals. D&R International. September 30, 2005.
[27] Alliance for Water Efficiency. "Transforming Water: Water Efficiency as Stimulus and Long-Term Investment." December 4, 2008. For the complete study visit: http://www.allianceforwaterefficiency.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=2638
[28] Klein, Gary. "California's Water-Energy Relationship." Sacramento: California Energy Commission, 2005.

preclude the need to construct expensive and energy-intensive new water supply projects. The City of New York, for example, replaced 1.3 million antiquated toilets in the 1990s. Through this and several other initiatives, the city reduced per capita water consumption 34% and saved the city nearly $200 million by allowing it to defer water supply and wastewater treatment projects for 10 years.[29] Finally, reducing water consumption allows more water to remain in rivers and streams, leading to healthier ecosystems that can support recreation, tourism and other downstream water needs.

### *Methodology*

The Alliance for Water Efficiency's recently-completed study provides an indication of the job creation and economic stimulus potential of water efficiency programs.[30] The report examines a variety of water efficiency investments, including:

- Indoor water efficiency: Replacing toilets, clothes washers, dishwashers, showerheads and faucets with more efficient models.
- Outdoor water efficiency: Installing smart irrigation controllers, efficient irrigation equipment and real-time monitoring.
- Commercial/industrial efficiency: Cooling tower upgrades, process water improvements, plumbing retrofits.
- Water utility efficiency: Municipal water utility leak detection and system water loss reduction programs.

The study uses an input-output model of the U.S. economy to measure the near-term creation of jobs and labor income, growth in GDP and total economic output resulting from a $10 billion investment in water efficiency. They derive water efficiency program expenditures and cost estimates from actual water and energy efficiency programs already developed for municipal water utilities. They include the economic impacts for all sectors of the economy impacted by a given program including manufacturing, warehousing, transportation and distribution.

[29] New York City Department of Environmental Protection. "Water Conservation Program" Flushing, NY: New York City Department of Environmental Protection, 2006.
[30] Alliance for Water Efficiency, op. cit.

***Results***

Total economic output per million dollars of investment is between $2.5 and $2.8 million. The gross domestic product (GDP) increases $1.3-1.5 million per million dollars of direct investment. Furthermore, every million dollars of direct investment in water efficiency programs creates 15-22 jobs. Table 5 lists a number of efficiency projects and details the economic and job creation benefits for each one. Based on these results, the Alliance for Water Efficiency's report concludes that a $10 billion investment in water/energy efficiency programs would raise the U.S. GDP $13-15 billion and create 150,000-220,000 jobs. It would also save 6.5-10 trillion gallons of water with a significant reduction in energy use as a result.

**Table 5 – Economic Stimulus Benefits, Per Million Dollars of Investment[31]**

| Program Option | Output (million $) | GDP (million $) | Labor Income (million $) | Employment (jobs) |
|---|---|---|---|---|
| Water System Loss Control | $2.82 | $1.44 | $1.05 | 21.6 |
| Irrigation Controller Rebate/Direct Install Programs | $2.55 | $1.31 | $0.85 | 20.4 |
| High Efficiency Toilet Rebate Program | $2.54 | $1.47 | $0.96 | 18.0 |
| High Efficiency Toilet Direct Install Program | $2.46 | $1.38 | $0.87 | 17.2 |
| Industrial Water/Energy Survey & Retrofit Program | $2.78 | $1.31 | $0.89 | 15.6 |

The direct and indirect economic benefits from a $10 billion water/energy efficiency program would be spread broadly throughout the economy. Table 6 details the economic benefits by economic sector.[32]

**Table 6 – Distribution of Benefits from $10 Billion Direct Investment in Water Efficiency Programs[33]**

| Economic Sector | GDP (Million $) | Employment (Jobs) |
|---|---|---|
| Ag, Forestry, Fish & Hunting | $89 | 1,706 |

[31] Alliance for Water Efficiency, op. cit.
[32] Economic sectors are classified according to the North American Industry Classification System (NAICS).
[33] Alliance for Water Efficiency, op. cit.

| | | |
|---|---|---|
| Mining | $181 | 591 |
| Utilities | $232 | 438 |
| Construction | $1,112 | 16,917 |
| Manufacturing | $2,313 | 24,315 |
| Wholesale Trade | $1,016 | 8,353 |
| Retail Trade | $1,398 | 24,768 |
| Transportation & Warehousing | $357 | 5,235 |
| Information | $431 | 2,459 |
| Finance & Insurance | $753 | 5,594 |
| Real Estate & Rental | $1,054 | 5,500 |
| Professional - Scientific & Tech Services | $818 | 9,123 |
| Management of Companies | $305 | 2,242 |
| Administrative & Waste Services | $682 | 18,191 |
| Educational Services | $57 | 1,651 |
| Health & Social Services | $437 | 8,328 |
| Arts - Entertainment & Recreation | $78 | 2,059 |
| Accommodation & Food Services | $220 | 7,077 |
| Other Services | $1,113 | 17,548 |
| Government & Non-NAICS | $857 | 13,409 |
| **Total** | **$13,501** | **175,504** |

This analysis clearly demonstrates that water efficiency programs have the potential to create jobs and stimulate manufacturing and many other sectors of the economy. The economic stimulus potential of these efficiency projects is similar to other types of public infrastructure investments. However, efficiency programs have the added advantage that they can be implemented relatively quickly and scaled according to need. They will be able to provide a more rapid economic stimulus than other type of infrastructure projects for which planning has not yet been completed.

### ***Wetland Restoration***

Wetlands are a vital part of the nation's water infrastructure. They provide untold benefits, from controlling floods and buffering communities from droughts to filtering pollutants and improving water quality. After centuries of neglect during which half of

the nation's wetlands were lost,[34] communities are beginning to realize that healthy wetlands are essential to ensuring a clean and consistent supply of water for future generations. Undoing centuries of damage will take significant time and resources, but it can also create jobs and stimulate local economies. While it is difficult to estimate the economic benefits of wetland restoration on a national scale, as an example, one restoration project in Illinois created over $12 million in economic output and directly employed 220 workers.[35]

Wetland restoration could provide an immediate boost to the economy. In a quick survey in November 2008, American Rivers compiled a list of 37 wetland restoration projects totaling $423 million in spending that are "ready to go," meaning that design and planning has been completed but additional funds are needed to begin work.[36] By funding these and other wetland restoration projects, millions of dollars can be injected into local economies helping community financial stability and protecting and restoring natural water supply and flood control infrastructure.

***Case Study: Cache River Wetlands Project***

The Cache River Wetlands are located in a watershed in southern Illinois. It is one of only 22 designated Wetlands of International Significance in the United States under the Ramsar Convention on Wetlands. Since 1991 a public-private partnership known as the Joint Venture Partnership has worked to protect a 60,000-acre wetland corridor along the Cache River. The group has undertaken significant efforts to restore the ecosystem through forest and wetland habitat restoration, reduction of sedimentation and stream bank/bed erosion and a partial reconnection of the upper and lower segments of the Cache River. With over $10 million in funding from county, state and federal agencies, the Partnership completed an extensive list of restoration projects between 1996 and 2005. In May 2008 the U.S. Fish and Wildlife Service released a report examining the

[34] Dahl, Thomas and Gregory Allord. "Technical Aspects of Wetlands: History of Wetlands in the Conterminous United States." United States Geological Survey Water Supply Paper 2425. http://water.usgs.gov/nwsum/WSP2425/history.html. Accessed November 19, 2008.
[35] Caudill, James. "The Economic Impacts of Restoration and Conservation-Related Expenditures: The Cache River Watershed in Southern Illinois." May 2008.
[36] American Rivers, NRDC, Environmental Law and Policy Center and the Ferguson Group. "Ready to Go Green Infrastructure Projects." December 11, 2008. www.americanrivers.org/stimulus

economic impact of this investment, which outlines the extensive benefits to the local and state economies.[37] The project directly employed hundreds and provided an economic boost to local businesses, but it also indirectly spurred economic growth as a result of the restored ecosystem.

Over the course of the ten year restoration project, nearly $10 million was spent on salaries, equipment and materials within the state.[38] Table 7 shows how the expenditures were divided between salary and non-salary expenses and whether the money was spent locally.[39] Salary expenses are income earned by workers, while non-salary expenses are used for the purchase of equipment, supplies, building materials, bulldozers or other needs. Millions of dollars in wages were paid to workers throughout the local area and the state. Overall, 220 workers were employed to carry out the restoration and construction work. Local businesses and suppliers also benefited from millions in income as a result of the restoration project.

**Table 7 – Restoration and Construction Expenditure Summary**

| Expenditure Type | Local Expenditures | Non-Local Expenditures | Total |
|---|---|---|---|
| **Salary** | $3,157,192 | $2,781,035 | $5,938,227 |
| **Non-salary** | $1,408,448 | $2,405,208 | $3,813,656 |
| **Total** | $4,565,640 | $5,186,243 | $9,751,883 |

The economic benefit of the Cache River Wetland restoration goes beyond the direct wages paid and equipment purchased. There is a significant secondary economic stimulus and job creation effect for the region and the state. The total economic output for the restoration project totals more than $12.6 million dollars (Table 8). This includes the salaries and equipment expenses from Table 7 and also indirect and induced effects. Indirect effects are the purchases by a retailer from a wholesaler or manufacturer that result from the direct expenditure. For example, if the agencies carrying out the

[37] Caudill, James., op. cit.
[38] Total construction costs totaled over $10.6 million, but the author of the economic impacts study only examines expenditures made in-state. A small amount, $871,179 or 8% of overall project costs, left the state. The remaining 92% of expenditures totals over $9.7 million.
[39] The local area is defined as Alexander, Pulaski, Johnson and Union counties.

restoration project purchase equipment from a retailer who subsequently purchases additional equipment from a manufacturer, the latter purchase would be counted as an indirect effect. Induced effects in this context refer to the increased spending by people employed in the restoration project. Together, the wetlands restoration project created total economic output of over $4 million for the local area and an additional $8.5 million for the state. In addition, over the ten year period, 130 jobs were created indirectly as a result of the restoration initiative which added additional income and additional tax revenue for the local area and the state.

**Table 8 – Summary of Restoration Economic Impacts**

| | Local Spending | Non-local Spending | Total |
|---|---|---|---|
| **Total Expenditures** | $4,565,640 | $5,186,243 | $9,751,883 |
| **Total Economic Output** | $4,157,221 | $8,475,142 | $12,632,363 |
| **Indirect Jobs Created** | 60 | 70 | 130 |
| **Indirect Employment Income** | $1,259,571 | $2,830,850 | $4,090,421 |
| **Tax Revenue** | $642,103 | $736,793 | $1,378,896 |

While we cannot extrapolate the economic benefit from this case study because, it demonstrates that wetland restoration can have a significant benefit to local communities and the region. The Cache River Wetland project directly created hundreds of jobs and provided an even greater stimulus indirectly through restoration spending. It also protected and revitalized a unique ecosystem that provides immense benefits to local communities in the form of wildlife habitat, flood control and water quality improvement.

***Green Jobs Summary***

The above analysis demonstrates that green infrastructure and water efficiency retrofit projects have a significant stimulus effect on local, regional and national economies. These projects are typically carried out for their important clean water benefits, but they can be an important part of an economic recovery plan as well. The multiple benefits green infrastructure provides will furthermore help communities secure sufficient clean water to support additional economic growth. Investing in green infrastructure now will

provide jobs in the near term and will ensure the clean water supplies essential to long-term economic health.

## Green Infrastructure Recommendations

Given the multiple benefits of green infrastructure to our communities and river systems, there is a great opportunity to promote green infrastructure and vibrant communities through federal policy. American Rivers recommends the following:

1. Integrate green infrastructure into broader water infrastructure spending and programs rather than treating it as separate. Mandatory set-asides in federal funding are critical in advancing these new approaches in the near-term, but future solutions must fully integrate green and traditional approaches. The City of Philadelphia Mayor's Office of Sustainability recently recommended strategies to greatly expand the number of green jobs in the City including raising awareness about green business opportunities and developing workforce readiness.[40] Federal funding of green initiatives will support efforts such as these and Philadelphia's goal to double the number of green jobs while helping the City eliminate combined sewer overflows and reduce flooding.

2. Support stand-alone legislative initiatives, like Representative Schwartz's Green Communities Act and others, to increase funding and technical assistance for green infrastructure in communities nationwide. Funding and technical assistance should be provided both as part of economic development and environmental protection programs.

[40] The City of Philadelphia Mayor's Office of Sustainability, *Greenworks Philadelphia*, 62-64. http://www.phila.gov/green/greenworks/index.html, Accessed May 2009

3. Provide authorization for EPA's WaterSense water efficiency program an EPA, a voluntary product labeling program that sets standards for water-efficient products like plumbing fixtures and appliances and allows manufacturers to certify their products under the WaterSense label. Similar to the successful EnergyStar program, WaterSense has the potential to save huge amounts of drinking water and reduce energy used to move and treat water

4. Fully implement Section 438 of the Energy Independence and Security Act that requires federal facilities to manage stormwater on-site and maintain predevelopment hydrology.

5. Hold federal agencies such as the Environmental Protection Agency accountable for facilitating and fostering green infrastructure in their policies, practices, and spending decisions. Specifically, EPA should provide guidance to states, including Pennsylvania, who must renew their municipal stormwater permits, on how to incorporate a performance-based stormwater standard into these permits to increase on-site treatment of stormwater using green infrastructure practices.

6. Protect and restore existing natural infrastructure critical for clean water by passing legislation to affirm the historic protections of small streams and wetlands afforded by the federal Clean Water Act.

7. Support research and development for innovative integrated green infrastructure but do not postpone investing in these smart strategies today.

We are at a pivotal moment in how we approach water management. Traditional water infrastructure will continue to play a role, but is designed to solve only a single problem and requires a huge capital investment. We must use this transformational moment to move to a wiser combination of green and traditional infrastructure that will meet the needs of the 21st Century. Building on the momentum that has been generated through the economic stimulus and on the great progress being made here in Pennsylvania, there

are many opportunities to act now to ensure enough clean water and economic health into the future. Thank you for the opportunity to testify on green infrastructure.